

US007495923B2

(12) **United States Patent**
Peng et al.

(10) **Patent No.:** **US 7,495,923 B2**
(45) **Date of Patent:** **Feb. 24, 2009**

(54) **HEAT DISSIPATION DEVICE HAVING
FIXING BRACKET**

(75) Inventors: **Xue-Wen Peng**, Shenzhen (CN);
Rui-Hua Chen, Shenzhen (CN)

(73) Assignees: **Fu Zhun Precision Industry (Shen
Zhen) Co., Ltd.**, Shenzhen, Guangdong
Province (CN); **Foxconn Technology
Co., Ltd.**, Tu-Cheng, Taipei Hsien (TW)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/781,706**

(22) Filed: **Jul. 23, 2007**

(65) **Prior Publication Data**

US 2009/0027855 A1 Jan. 29, 2009

(51) **Int. Cl.**
H05K 7/20 (2006.01)
F28F 7/00 (2006.01)

(52) **U.S. Cl.** **361/719**; 165/80.3; 165/185;
165/104.33; 361/704; 361/700

(58) **Field of Classification Search** None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,272,599	A *	12/1993	Koenen	.....	361/710
6,385,046	B1	5/2002	Ta et al.		
6,671,177	B1 *	12/2003	Han	.....	361/719
6,717,811	B2 *	4/2004	Lo et al.	.....	361/698
6,822,861	B2 *	11/2004	Meir	.....	361/695
7,019,974	B2 *	3/2006	Lee et al.	.....	361/700
7,283,364	B2 *	10/2007	Refai-Ahmed et al.	.....	361/719
7,382,618	B2 *	6/2008	Peng et al.	.....	361/715
2006/0164808	A1 *	7/2006	Stefanoski	.....	361/700
2007/0139894	A1 *	6/2007	Chang et al.	.....	361/715

* cited by examiner

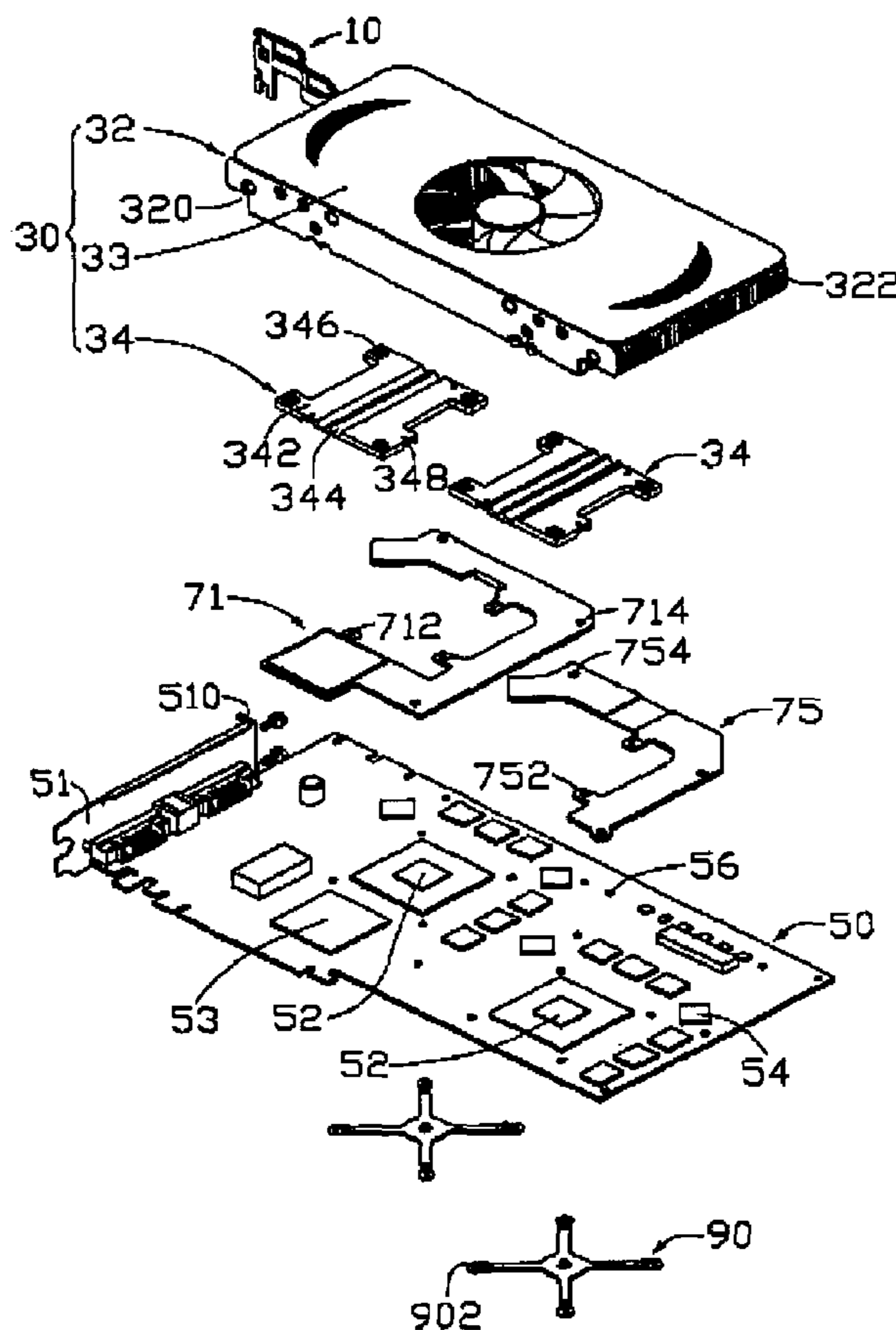
Primary Examiner—Gregory D Thompson

(74) *Attorney, Agent, or Firm*—Frank R. Niranjan

(57) **ABSTRACT**

A heat dissipation device for an add-on card in a computer enclosure includes a heat sink mounted on the add-on card and a fixing bracket. The fixing bracket includes a connecting portion fixed to the heat sink and a securing portion for being fixed to a panel of the computer enclosure and a mounting plate of the add-on card. The fixing bracket is configured to rest a part of weight of the heat sink on the computer enclosure.

13 Claims, 4 Drawing Sheets



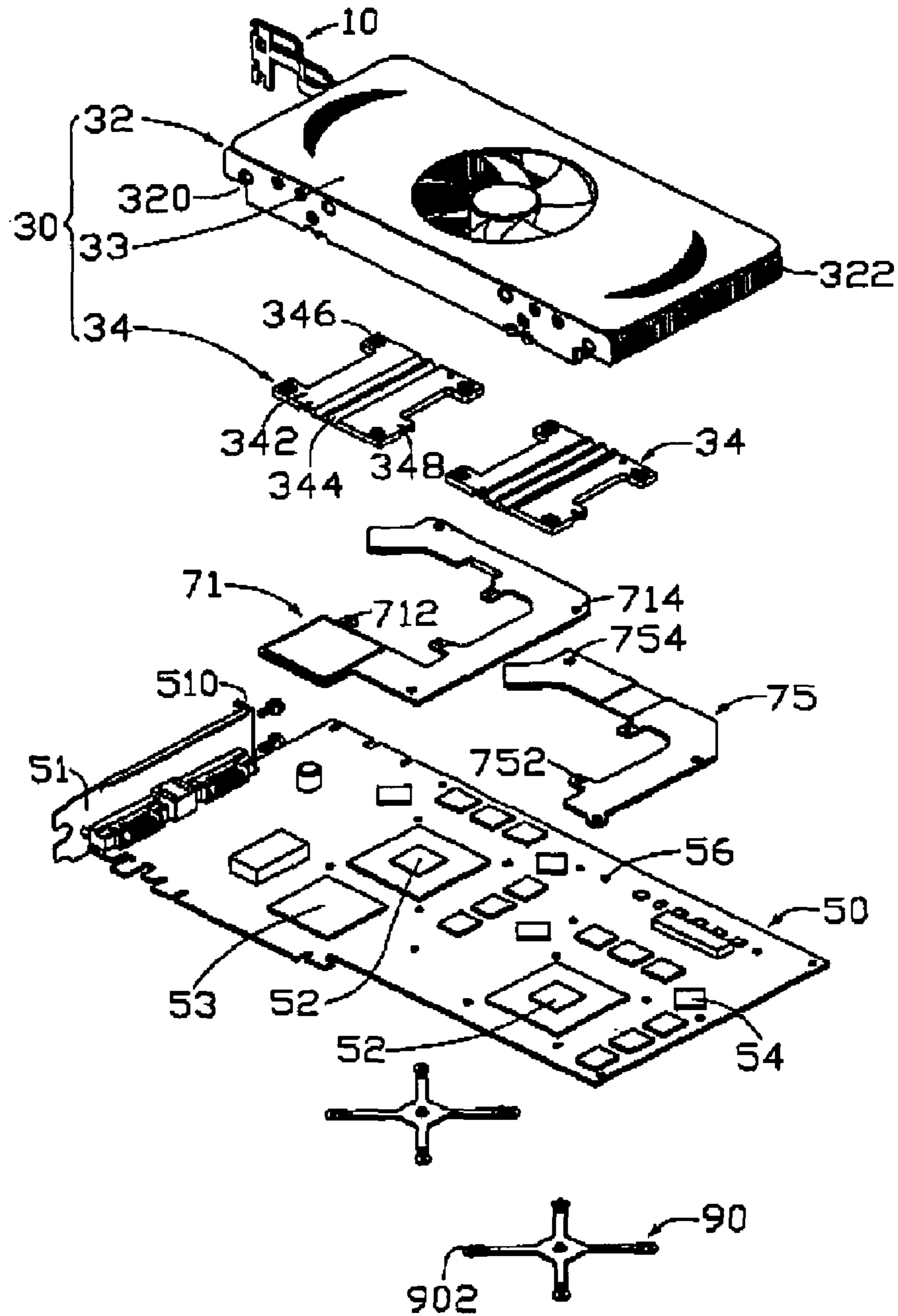


FIG. 1

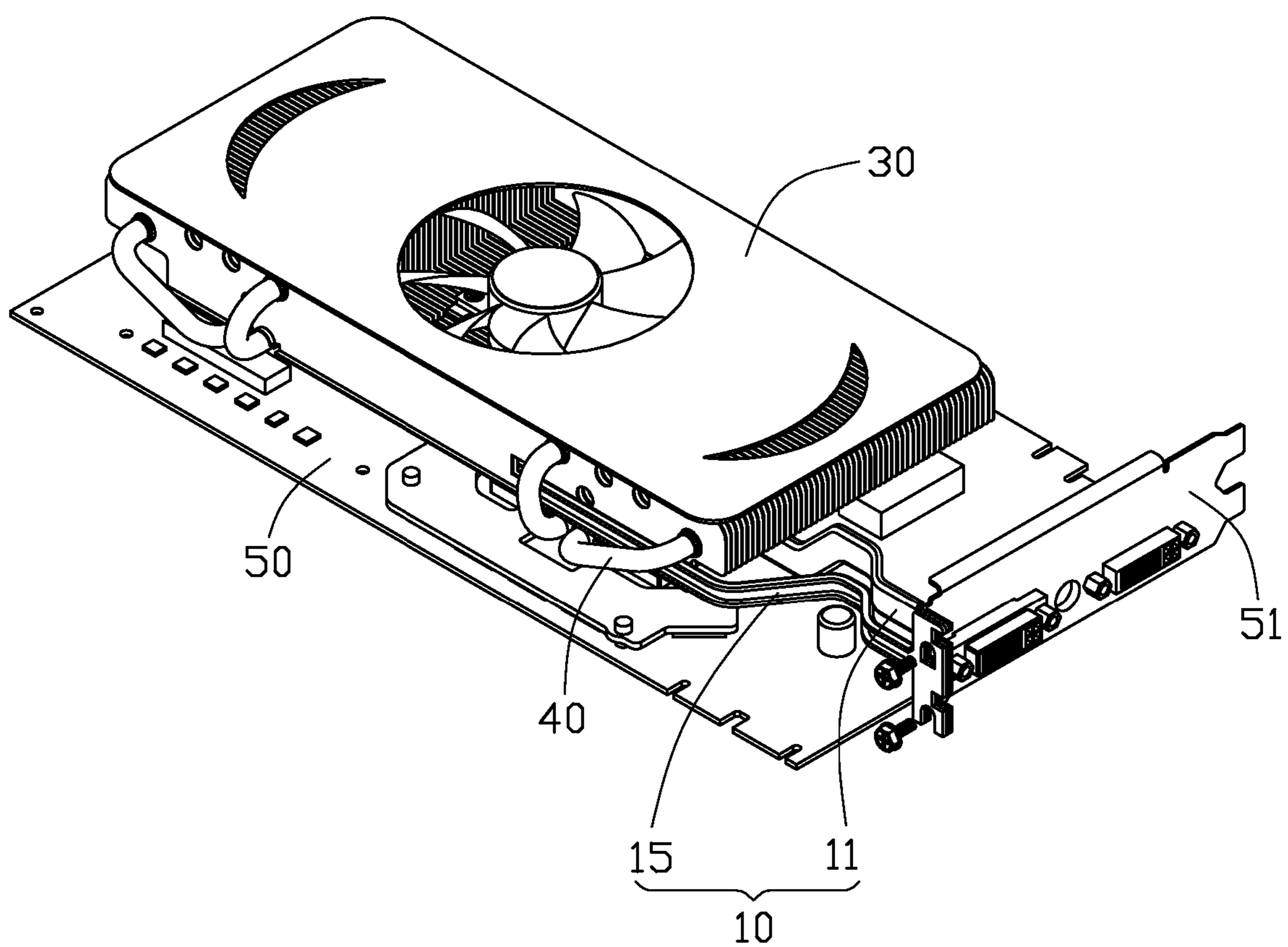


FIG. 2

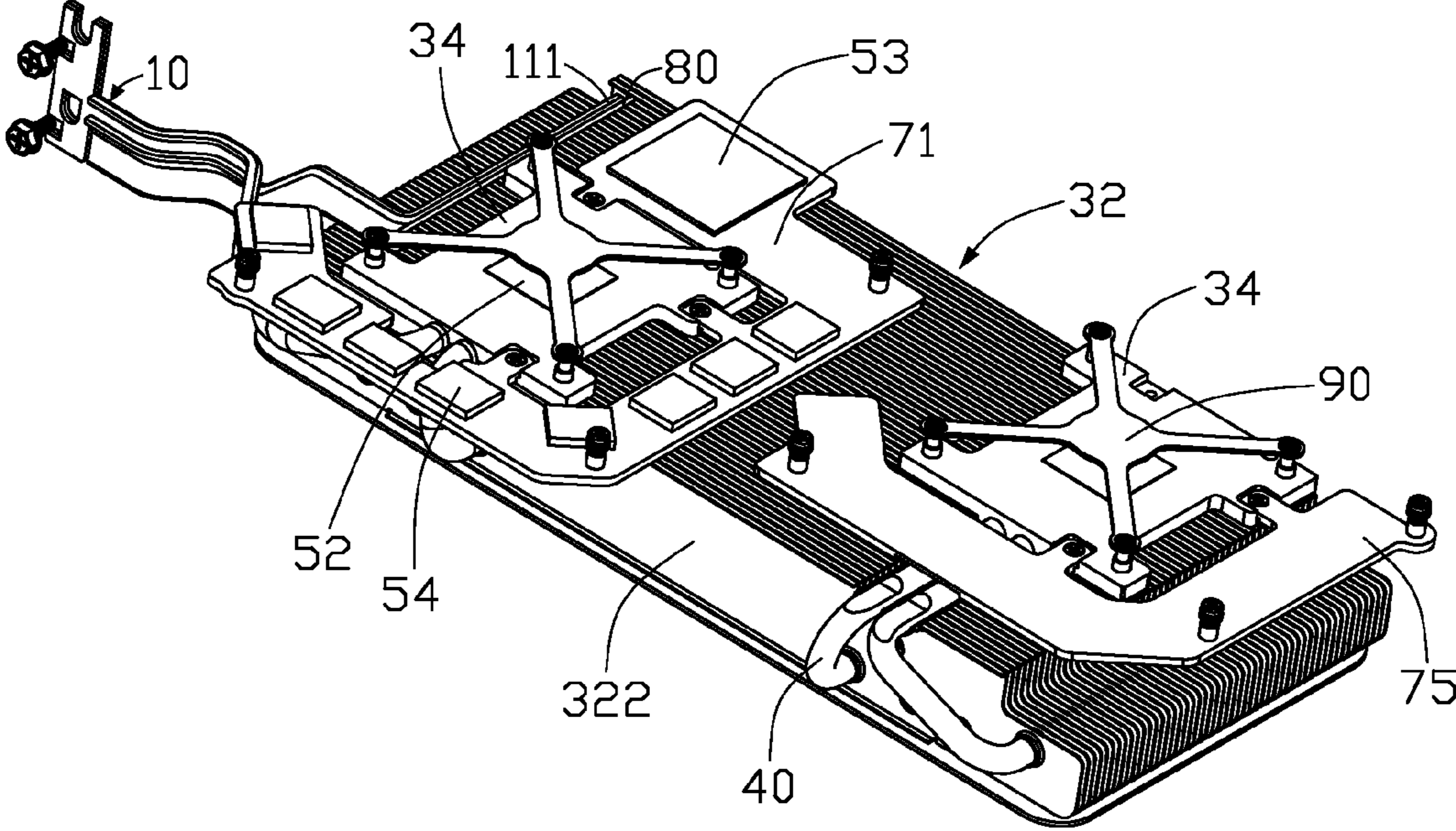


FIG. 3

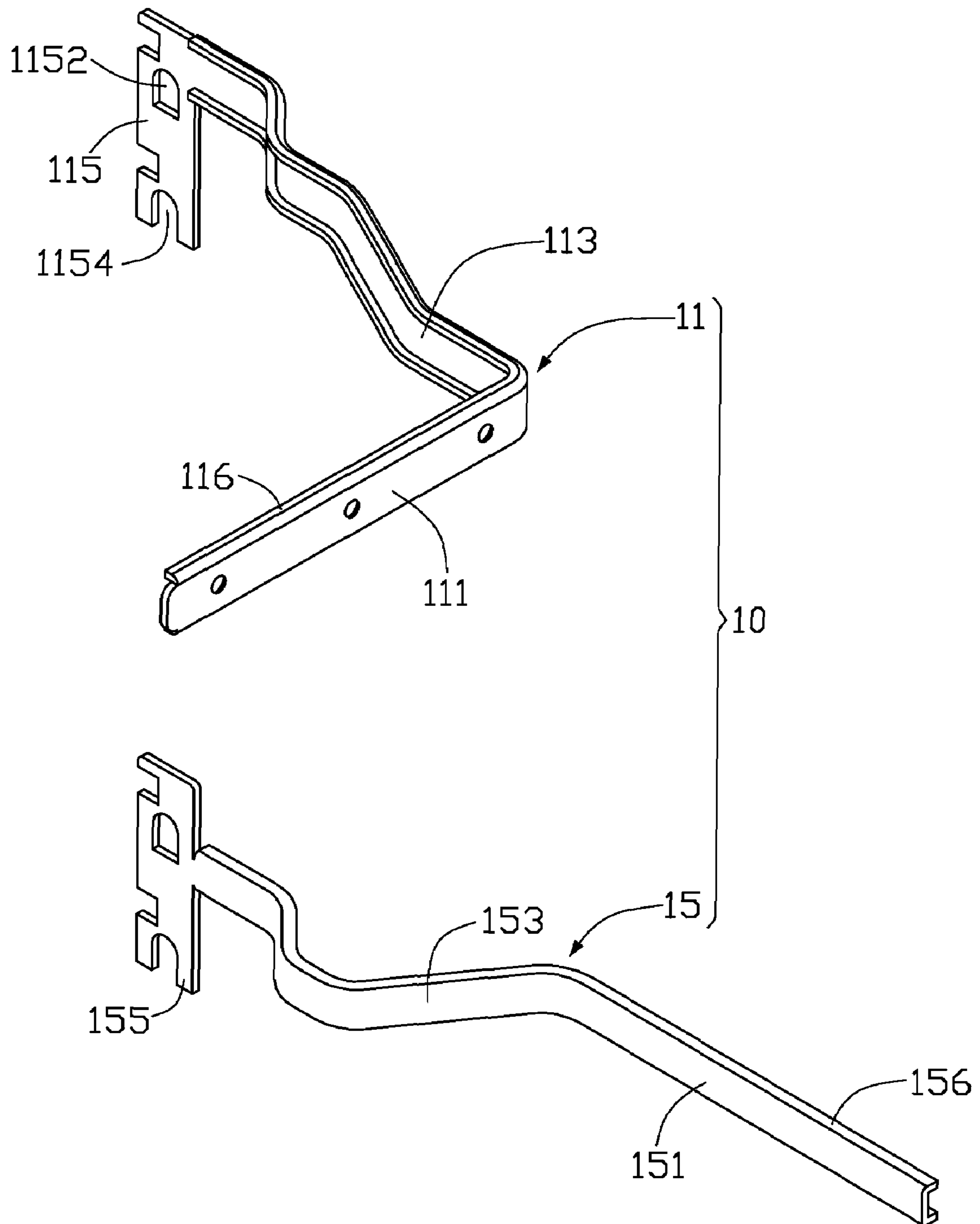


FIG. 4

HEAT DISSIPATION DEVICE HAVING FIXING BRACKET

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a heat dissipation device for computer add-on cards, and more particularly to a heat dissipation device having a fixing bracket, wherein the fixing bracket connects the heat dissipation device to a computer enclosure to reduce pressure endured by the add-on cards due to weight of the heat dissipation device.

2. Description of Related Art

In order to enable desktop and other computers to cope with modern applications, like high-resolution graphics, wireless communication etc, add-on cards are often installed in computer devices to enhance their operative abilities. One example of such a card is a graphics card comprising a separate processor, called a GPU (graphics processor unit). The GPU generates a large amount of heat during operation. When the temperature of the GPU exceeds a certain level, the GPU may malfunction, or in the worst case fail outright. For this reason, a heat dissipation device is commonly installed on the GPU to dissipate the heat generated by the GPU and other electronic components adjacent to it into ambient air.

As the operation speed of electronic component becomes faster, the heat dissipation device needs to be larger to dissipate heat therefrom. Thus, high-speed add-on cards may become damaged by the weight of the heat dissipation device.

What is needed, therefore, is a heat dissipation device having a fixing bracket for the heat dissipation device to reduce the pressure endured by the add-on card due to the weight of the attached heat dissipation device.

SUMMARY OF THE INVENTION

A heat dissipation device for an add-on card in a computer enclosure includes a heat sink mounted on the add-on card and a fixing bracket. The fixing bracket includes a connecting portion fixed to the heat sink and a securing portion fixed to a panel of the computer enclosure. The fixing bracket is configured to rest part of weight of the heat sink on the computer enclosure.

Other advantages and novel features will become more apparent from the following detailed description of preferred embodiments when taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of the present apparatus can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present apparatus and method. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. 1 is an exploded, isometric view of a heat dissipation device in accordance with a preferred embodiment of the present invention and a graphics card;

FIG. 2 is an assembled view of FIG. 1, wherein the heat dissipation device having a fixing bracket is assembled to the graphics card;

FIG. 3 is a view similar to FIG. 2, but shown from a bottom of the heat dissipation device and the graphics card taken away; and

FIG. 4 is an enlarged view of the fixing bracket of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, a heat dissipation device in accordance with a preferred embodiment of the present invention is illustrated. The heat dissipation device is mounted on a graphics card **50** in a computer enclosure (not shown) and used for dissipating heat generated by a pair of GPUS **52** mounted on the graphics card **50** and other electronic components **53, 54** mounted around the GPUS **52**. The heat dissipation device comprises a fixing bracket **10**, a heat sink **30** and two conductor bases **71, 75**. The fixing bracket **10** is attached to the heat sink **30** and cooperates with a panel (not shown) of the computer enclosure to rest part of weight of the heat sink **30** on the computer enclosure; thus, a pressure on the graphics card **50** due to the weight of the heat sink **30** is reduced.

The GPUS **52** are separately located at a top surface of the graphics card **50**, and the electronic components **53, 54** are located around the GPUS **52** and a plurality of through holes **56** are defined around the GPUS **52** and the electronic components **53, 54**. A mounting plate **51** is perpendicularly formed at a rear edge of the graphics card **50**. A flange **510** is formed at an end of the mounting plate **51** engaged with the fixing bracket **10** and the panel of the computer enclosure.

The heat sink **30** generally comprises a fin group **32**, a pair of base plates **34** separately located at a bottom surface of the fin group **32**, a plurality of heat pipes **40** thermally connecting the fin group **32** and the base plates **34**, and a lid **33** mounted onto the fin group **32**. A fan (not labeled) is mounted on a top of the fin group **32**. The lid **33** is mounted on the fin group **32** and covers the fan, and the lid **33** defines an opening (not labeled) in alignment with the fan. An airflow generated by the fan can flow through the fin group **32** to take heat away therefrom.

Referring to FIGS. 2-3, the fin group **32** comprises a plurality of parallel fins **322**. The fin group **32** is cut away at a lower portion at opposite front and rear sides thereof to define a pair of opposite cutouts **320**. Each base plate **34** has a rectangular shape and has a bottom face for contacting with the GPU **52**. Four ears (not labeled) are formed at four corners of each base plate **34**. A mounting hole **346** is defined in each of the ears of the base plate **34** for providing a passage for a corresponding fastener (not shown) to fix the heat dissipation device on the graphics card **50**. A screw hole **348** is defined in three of the ears and located beside the mounting holes **346**. A pair of adjoining semicircular grooves **344** are defined on a top surface **342** of each of the base plates **34** for receiving the heat pipes **40** therein.

The conductor bases **71, 75** are attached on a top surface of the electronic components **53, 54** for dissipating heat generated by the electronic components **53, 54**. A plurality of through holes **712, 714, 752, 754** are defined in the conductor bases **71, 75**, wherein the through holes **712, 752** are aligned with corresponding screw holes **348** and the through holes **714, 754** are aligned with corresponding through holes **56**. After the base plates **34** are assembled with the fin group **32**, screws (not shown) extend through the through holes **712, 752** of the conductor bases **71, 75** and the screw holes **348** in series to attach the conductor bases **71, 75** to the base plates **34**. The configuration of the conductor bases **71, 75** depends on distribution of the electronic components **53, 54** mounted on the graphics card **50**.

The heat dissipation device further comprises two back plates **90** to reinforce the graphics card **50**. The back plates **90** are separately positioned below the bottom side of the graphics card **50**. Each back plate **90** is cross-shaped and defines four through holes **902** therein. Four screws (not labeled) extend through the through holes **902** of each back plate **90**

3

and corresponding through holes **56** of the graphics card **50** around a corresponding GPU **52** to threadedly engage in the mounting holes **346** of a corresponding base plate **34** to mount the back plates **90** to the graphics card **50**. Thus, the heat dissipation device is mounted to the graphics card **50**.

Referring to FIGS. **3-4**, the fixing bracket **10** is made from a metallic sheet and comprises a first fixing bracket **11** and a second fixing bracket **15**.

The first fixing bracket **11** comprises a connecting portion **111**, an extension portion **113** extending from an end of the connecting portion **111** and a securing portion **115** extending perpendicularly from a free end of the extension portion **113**. The connecting portion **111** has an elongated rectangular configuration and engages with a rear edge of the fin group **32** at the cutout **320** adjacent to the mounting plate **51** of the graphics card **50**. The securing portion **115** has a top surface aligned with top surfaces of the connecting portion **111** and extension portion **113**. A mounting plate **80** having a configuration similar to the connecting portion **111** is mounted on the rear edge of the fin group **32**. Screws (not shown) extend through the connecting portion **111** and the mounting plate **80** to fasten the connecting portion **111** to the fin group **32**. Alternatively, the connecting portion **111** can be directly soldered to the rear edge of the fin group **32**. The extension portion **113** has a curved configuration to increase the elasticity of the first fixing bracket **11**. A pair of reinforced ribs **116** are formed at opposite top and bottom surfaces of the connecting portion **111** and the extension portion **113** in generally parallel directions. Each reinforced rib **116** is a strip configured to reinforce the strength of the first fixing bracket **11**. The securing portion **115** defines two through holes **1152**, **1154**.

The second fixing bracket **15** is similar to the first fixing bracket **11** and comprises a connecting portion **151**, an extension portion **153** and a securing portion **155**. The connecting portion **151** has an elongated rectangular shape and is soldered to another side of the fin group **32**. The extension portion **153** extends from an end of the connecting portion **151**. The securing portion **155** extends perpendicularly from the extension portion **153** and in a similar direction to the securing portion **115** of the first fixing bracket **11**. A joint (not labeled) between the extension portion **153** and the securing portion **155** is located generally in a middle portion of a side surface of the securing portion **155** in a manner such that the extension portions **113**, **153** are staggered with each other when the two securing portions **115**, **155** are engaged with each other to be screwed to the flange **510** of the mounting plate **51** and the panel of the computer enclosure. A pair of reinforced ribs **156** are formed at opposite top and bottom surfaces of the connecting portion **151** and the extension portion **153** in generally uniform directions. The reinforced rib **156** is a strip configured for reinforcing the second fixing bracket **15**.

Referring to FIG. **2**, in assembly, the connecting portions **111**, **151** of the fixing bracket **10** are fixed to the fin group **32** and the securing portions **115**, **155** are overlapped each other. The connecting portions **111** and **151** are perpendicular to each other. Screws (not labeled) extend through the through holes **1152**, **1154** and corresponding through holes (not labeled) of the securing portions **115**, **155** and the flange **510** of the mounting plate **51** of the graphics card **50** to threadedly engage with the panel of the computer enclosure to mount the first and the second fixing bracket **11**, **15** together with the heat sink **30** also on the computer enclosure. By the fixing bracket **10**, a part of weight of the heat sink **30** is supported by the panel of the computer enclosure; thus, pressure on the graphics card **50** due to the weight of the heat sink **30** can be lessened, whereby possibility of damage to the graphics card

4

50, particularly to the GUPS **52** due to the heavy weight of the heat sink **30** during transportation or operation of the computer can be reduced.

It is believed that the present embodiments and their advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the examples hereto described merely being preferred or exemplary embodiments of the invention.

What is claimed is:

1. A heat dissipation device for an add-on card in a computer enclosure, comprising:

a heat sink adapted to be mounted to the add-on card and thermally connecting with electronic components of the added-on card;

a fixing bracket connecting with the heat sink and adapted for being secured to a panel of the computer enclosure to rest a part of weight of the heat sink on the computer enclosure, the fixing bracket comprising a connecting portion fixed to the heat sink, a curved extension portion extending outwardly from an end of the connecting portion and a securing portion extending from a free end of the extension portion, the securing portion being adapted to be connected to the panel of the computer enclosure; and

another fixing bracket similar to the fixing bracket.

2. The heat dissipation device of claim **1**, wherein the another fixing bracket comprises a connecting portion fixed to the heat sink, a curved extension portion extending from an end of the connecting portion, and a securing portion extending from a free end of the extension portion and adapted to be fixed to the panel of the computer enclosure, the connecting portion of the another fixing bracket and the connecting portion of the fixing bracket being oriented perpendicular to each other.

3. The heat dissipation device of claim **2**, wherein the heat sink comprises a base plate adapted to be attached on the electronic components of the add-on card and a fin group mounted on the base plate.

4. The heat dissipation device of claim **3**, wherein the connecting portion of the fixing bracket is fixed to a side of the fin group, and the connecting portion of the another fixing bracket is fixed to another side adjacent to the side of the fin group.

5. The heat dissipation device of claim **4**, wherein the extension portion of the fixing bracket is staggered with the extension portion of the another fixing bracket.

6. The heat dissipation device of claim **5**, wherein a pair of reinforce ribs are formed at opposite top and bottom surfaces of the connecting portion and the extension portion of each of the fixing bracket and the another fixing bracket in uniform directions.

7. The heat dissipation device of claim **2**, wherein the connecting portions and the extension portions of the fixing bracket and the another fixing bracket are elongated.

8. The heat dissipation device of claim **3**, wherein a fan is mounted on a top of the fin group, a lid is mounted on the fin group and covers the fan, and the lid defines an opening in alignment with the fan.

9. The heat dissipation device of claim **1** further comprising a back plate adapted to be mounted below a bottom side of the add-on card.

10. The heat dissipation device of claim **3** further comprising a conductor base adapted to be mounted around the base plate and cover other electronic components mounted on the add-on card.

5

11. An electronic assembly comprising:
an add-on card having a heat-generating electronic component thereon and a mounting plate adapted for mounting the add-on card to a panel of a computer enclosure;
a heat sink attached to the add-on card and thermally connecting with the heat-generating electronic component;
and
a fixing bracket having a connecting portion fixed to the heat sink and a securing portion adapted to be fixed to the mounting plate of the add-on card and the panel of the computer enclosure.

6

12. The electronic assembly of claim **11**, wherein the connecting portion of the fixing bracket has two branches which are fixed to different sides of the heat sink and perpendicular to each other.

13. The electronic assembly of claim **12**, wherein the fixing bracket further comprises a curved extension portion interconnecting the two branches of the connecting portion and the securing portion.

* * * * *